MONTANA DEPARTMENT OF AGRICULTURE

# Pollinator Protection Plan

302 North Roberts Street
PO Box 200201
Helena MT 596203

Phone: 406-444-5400
Fax: 406-444-9493
E-mail: agr@mt.gov
Website: www.agr.mt.gov

# Introduction

The Department of Agriculture recognizes that the health of pollinators is beneficial to agriculture and the environment. The department also recognizes the benefits of using crop-protection chemicals to manage pests and diseases that adversely affect crop production. It has become apparent, however, that there is a growing need for a balanced public policy that encourages practices that reduce the risks of agricultural practices that affect pollinators without having an unreasonable impact on the efficiency of agricultural production in Montana.

The primary focus of this plan will be on the interaction between managed pollinators and crop-protection chemicals. There is good evidence that the management practices specified below will also benefit native pollinators. Practical considerations, however, including both financial considerations and the difficulty of evaluating native pollinator populations, dictate that the initial focus of our efforts should be on managed pollinators, principally honey bees, and agricultural chemicals, primarily insecticides and fungicides.

What follows are best management practices and suggestions to encourage and facilitate communication between beekeepers and agricultural producers, two groups with many interests in common but who sometimes find themselves at odds especially over crop-protection chemicals and land use issues. These are not regulatory requirements, and they do not take the place of or in any way relieve applicators from the legal requirement to follow the pesticide product label.

All pollinators can tolerate only a certain amount of biological and environmental stress. The current regulatory and economic framework makes the mitigation of honey bee exposure to pesticides used outside the hive one of the easiest and most productive areas in which to

focus pollinator protection efforts. Keeping pesticides away from bees, and bees away from pesticides, offers more benefit per unit of effort and is thus the most logical place for our efforts to begin.

Because it is not regulatory in nature, this pollinator protection plan will always be a work in progress. We, the Montana Dept. of Agriculture, intend to revisit and update this document as needed as our knowledge of the factors that affect pollinator health increases. For example, recent research has revealed the importance of nutrition. Bees are significantly healthier when they feed on a variety of pollen and nectar sources, and healthier bees are more resistant to the effects of pesticide exposure, parasites, and disease. Researchers are also beginning to develop an understanding of the synergistic effects of crop-protection chemicals (some fungicides have recently been shown to increase the toxicity of the insecticides with which they are often tank-mixed) and the interactions of viruses, parasites, and diseases (many of the neurological bee viruses have turned out to be vectored by the *Varroa* mite, and cause behavioral symptoms that closely parallel the effects of neonicotinoid pesticide exposure). As research suggests new ways that managed pollinators can be protected from the stresses inherent in their association with production agriculture, the recommendations in this document will change accordingly.

While the focus of this document is on managed pollinators, principally honey bees, and agricultural pesticides, the majority of the management practices detailed here will also substantially benefit the native pollinator community. Native pollinators have very similar requirements for varied and nutritious forage, they are just as susceptible to chemical residues, and many of them have very specific habitat requirements. It is difficult to provide a multitude of specific habitat types for small, dispersed populations of non-social native pollinators, but the

benefits of increased forage and proper chemical applications readily translate to these important species as well.

# Challenges Faced by Beekeepers

It sometimes seems that every year brings a new set of challenges to beekeepers. *Varroa* mites arrived in the US in 1988 and quickly became the #1 killer of beehives. *Nosema ceranae*, a more virulent species of the common fungal disease *N. apis*, arrived in the US in the late 1990s and quickly replaced its less pathogenic cousin. *N. ceranae* is thought by some authorities to be a significant contributor to "colony collapse disorder," the most well-known of the current maladies affecting beehives. As if all that weren't enough, beekeepers also deal with the small hive beetle, tracheal mites, and a host of newly-discovered viral diseases. Meanwhile, all of the historical bee diseases, the foulbroods, sacbroods, chalkbroods, and others continue unabated. Year to year colony survival is highly variable, but almost all beekeepers report significant losses every year.

New classes of pesticides such as neonicotinoids and insect growth regulators have far less acute toxicity to honey bees than older classes of pesticides (*e.g.,* organophosphates and carbamates) and have allowed beekeeping to return to some agricultural areas (the "cotton belt" in the Deep South, for example) where beekeeping had been made very difficult because of pesticide use. Both of these new insecticide types pose unique challenges both to beekeeping and to our existing regulatory framework.

Neonicotinoids and insect growth regulators are particularly dangerous to social insects. Neonicotinoids because they disrupt the complex behaviors of social insects, even at very low

sub-lethal doses, and growth regulators because the susceptible sub-adult stage is always present in the population. Our current regulatory framework relies on measurements related to mortality (the LD50 and related metrics) rather than more subtle and difficult to measure changes in behavior and development.

Finally, there is an emerging body of research indicating that herbicides and fungicides, compounds that historically have not been thought to pose a serious threat to honey bees, can have serious effects on brood and may synergize the effects of other pesticides. (Synergistic effects are a particular issue with tank mixes, but these are well beyond the introductory scope of this management plan.)

Growers and pesticide users cannot help beekeepers manage threats from the mites, beetles, and microbes that weaken their hives. They can, however, help with reducing their exposure to pesticides and improving the quality of available forage. Honey bees obtain proteins from pollen and carbohydrates from nectar. They are healthier when they obtain these nutrients in a balanced diet from a wide variety of plants. Unfortunately, locations with a variety of plants for bees to forage on are becoming increasingly rare. Bees forced to feed on the large-scale monocultures common in modern agriculture can become weakened from an improper balance of nutrients, making them easy targets for pests and pathogens. Bees provided with a varied diet from high quality forage are better able to handle stressors from all elements, including pesticides. Strong and healthy colonies are much better able to overcome parasites and disease than colonies weakened by poor nutrition and pesticide exposure.

# Challenges Faced by Growers and Pesticide Users

There are many challenges to growing a profitable crop. Some are beyond the grower's control, like droughts, floods, and weather. Weeds, pests, and diseases can be managed, but every input has a cost. Pollinators themselves can be a significant expense for crops that require them, and even for crops that don't, their mere presence can interfere with pesticide applications that may be absolutely necessary for the grower to produce an acceptable yield and a profitable crop. Growers must choose pest management tools and methods that not only comply with legal requirements and best management practices, but also that have their effects quickly enough to preserve their crops.

Applicators must also avoid sensitive areas adjacent to treatment sites, such as surface water, endangered species, organic fields, vineyards, and bee hives. Since the ideal times to apply many chemical remedies coincides with the times of day when pollinators are most active, pesticide applicators are often put in the difficult position of balancing pest management needs against pollinator protection requirements. It is against this backdrop of competing interests that this pollinator protection plan is offered.

# Pollinators and Pesticides

Protecting pollinators from pesticide impacts is important to the sustainability of agriculture. Pesticide applicators must determine if there is a clear hazard to managed or wild populations of pollinators when applying pesticides. Pesticide residues can persist in the soil and environment for months or years after a single application. When selecting pesticides, the goal

is to achieve maximum benefit with minimum negative impact on the environment. Potential exposure of bees to pesticides can vary greatly depending on the type of pesticide, formulation, application method, label restrictions, and other factors.

## Effects of Pesticides on Bees

Honey bees are highly social, and a single colony may contain as many as 60,000 individuals, depending on the time of year and availability of nectar and pollen-bearing blossoms. Each colony consists of three types of individuals: queens, drones, and workers. A single fertile queen lays all the eggs for her colony and is the sole reproductive bee in that colony. The male drones do little work around the hive, and their principle job is to provide sperm to virgin queens. The vast majority of the bees in a colony are female workers and are responsible for doing all the work in the hive, including but not limited to foraging and processing food, caring for the brood or young bees, defending the colony, and maintaining the colony's temperature. Hive bees build wax, care for the brood, cap cells, process pollen and nectar gathered in the field by older workers, and clean the nest. Field bees, or foragers, actively collect nectar, pollen, water, and propolis (sap or other resinous materials secreted by plants).

Honey bee larvae are particularly susceptible to the effects of pesticides because of their rapid rate of growth and development. For their first 3 days of life, larval bees are fed protein-rich secretions produced by young worker bees. These “nurse bees” consume large amounts of pollen in order to feed the larvae. Pesticide residues in pollen affect the nurse bees, but also are concentrated and transferred to the larvae. This process can lead to the delayed death of the hive because of brood failure, even weeks after the initial exposure. Developing larvae are

disproportionately affected by a number of herbicides and fungicides that have little to no effect on adult bees at field-relevant exposures.

Honey bee queens are also more susceptible to ill effects from pesticide exposure. They live longer, retain developing and differentiating tissues in their ovaries, and have a diet that is higher in protein than that of the workers. Queens frequently become temporarily or permanently sterile following exposure to pesticides, including some herbicides and fungicides. Without the queen to lay eggs, the colony soon dies.

The "field bees" that collect nectar and pollen can, of course, be killed by acute exposure to pesticides. Such instances are extremely hard to document and prove, particularly to the level of certainty required in a regulatory or enforcement context. Field bees also transport contaminated pollen and nectar back to the hive. A sufficient dose of fast-acting pesticides like synthetic pyrethroids will typically kill foragers in the field, leading to a swift but not immediate decline in the strength of the hive. Exposure to slower-acting pesticides may result in enough residues being returned with the foragers to kill the entire colony within hours of exposure. Chronic pesticide exposure may cause lethal and sub lethal effects on the brood, workers, drones, and queen.

Sub-lethal effects are particularly troublesome where the neo-nicotinoid pesticides are concerned. In social insects, neonicotinoids can be spread from one individual to another during grooming, feeding, and other activities. Exposure to even very low levels of neonicotinoids has a profound effect, breaking down the complicated social behaviors required to keep social insect colonies healthy and functioning. (Neonicotinoids are very effective termiticides for the same reason.) At the level of the individual bee, sub-lethal exposures to neonicotinoids interfere with memory, navigation, and foraging. Reproductive effects may include reduced sperm viability

in drones that causes poor mating for queens, and disruption of ovary activation in the developing queen. Compounded sub lethal effects of individual bees may result in colony-level effects, such as poor brood build-up, poor nourishment, frequent queen replacement (supersede), low overwintering success, and, potentially, colony demise. There is much debate over whether the residue levels bee encounter in the field cause these effects, but the effects themselves are not in doubt.

# The Plan

Bees are necessary for pollination of about two-thirds of agricultural crops currently in production, and without these crops to feed on honey bee populations would not be sustainable at their current levels. The goal of this plan cannot be to eliminate pesticide use anywhere bees might be foraging. Nor is it reasonable to require moving bee hives every time there is a pesticide application in the area. All of the requirements currently present on pesticide product labels will remain in force. But regulatory action and enforcement alone will not resolve the conflicts between beekeepers and producers. Instead, we must focus on the areas where their interests coincide (healthy bees and successful pollination) in order to mitigate conflicts in areas where they do not (*e.g.,* pesticide use).

This Pollinator Protection Plan contains guidelines for pesticide users, landowner/growers, and beekeepers in hopes of creating the following positive outcomes:

- Ensuring positive relationships and peaceful co-existence among beekeepers, landowners, and pesticide applicators,
- Improving communication and cooperation between landowners, beekeepers, and

applicators to minimize the effects of agricultural chemical use on pollinators,

- Reducing pesticide exposure and subsequent risk of pesticides to pollinators,
- Ensuring both a robust apiary industry and agricultural economy, and
- Continued high compliance with state pesticide and apiary requirements.

# Guidelines for Pesticide Users

**Observe all pesticide label directions and adhere to the requirements of the Montana Pesticide Act (Sections 80-8-101 through 121, Montana Code Annotated) and associated Administrative Rules of Montana (Administrative Rules of Montana 4.10.101 through 209).**

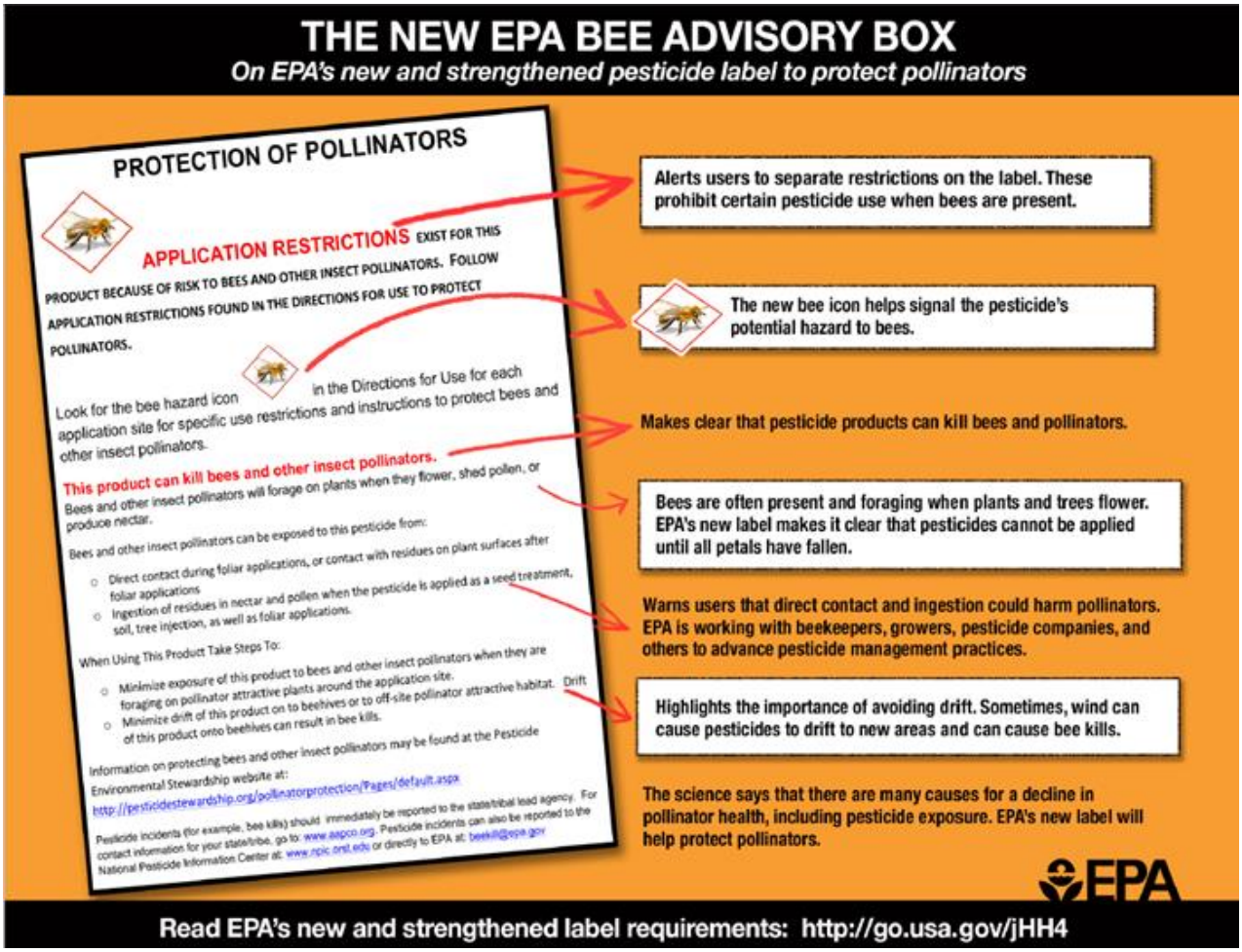
For assistance in determining the best management practices to use in your situation, consult your local department of agriculture specialist, extension agent, Montana State University specialist, crop consultant or chemical company representative.

**Use Integrated Pest Management (IPM).** Utilize economic thresholds and IPM to determine if insecticides are required to manage pests. When insecticides are required, try to choose insecticides with low toxicity to bees, short residual toxicity, or repellant properties towards bees.

**Use registered pesticides according to the label.** Pesticide label language is developed to ensure that pesticides will not pose a risk of unreasonable adverse effects to human health or the environment. Failure to comply with the label not only puts humans and the environment at risk, it is also illegal. Many pesticides, especially insecticides, have use restrictions prohibiting applications when bees are foraging in the treatment area, or applications that may leave dangerous residues the next time bees visit the site. Some

labels prohibit applications when crops are blooming and require that the applicator notify beekeepers in the area prior to application. Always comply with these and other label restrictions to reduce risks. Applicators are bound by all directions, precautions and restrictions on pesticide labeling. Contact the Montana Department of Agriculture with any questions on pesticide label language.

**Observe Key Pesticide Label Icons.** Pesticide labels are required to carry specific warnings on the labels to alert the pesticide user of the risk to pollinators.




**When possible, apply pesticides early in the morning or in the evening.**

Pollinators are most active during daylight hours and when the temperature is over 55 degrees Fahrenheit. Pesticides on plant surfaces become significantly less toxic to non-

target organisms as they dry. An early-morning application allows drying to occur before bees start foraging. Similarly, a late-afternoon or evening application allows for several hours of drying, incorporation, and breakdown of the chemical before pollinators begin foraging the next day. All of these factors reduce the biological availability of the material to foraging honey bees and other pollinators. Be cognizant, however, of temperature restrictions on pesticides. The efficacy of some pesticides is reduced at certain temperatures. Also be aware of temperature inversions when choosing the best time for application.

**Avoid drift.** Pesticide drift is the off-site movement of pesticides through the air from the treatment site to adjacent areas, either in the form of a mist, particles, or vapor. Drift reduces the effectiveness of the application since only part of the applied amount reaches the target. Drifting chemicals also pose a risk to non-target organisms that come in contact with the off-target residues. These insecticides can negatively affect bees and other beneficial insects by direct contact or by contaminating their forage and habitat. Drifting herbicides have the potential to further reduce quality forage available to pollinators.

**Identify and notify beekeepers in the area prior to pesticide applications.** Bees will fly several miles to find quality forage. Therefore, pesticide applicators should identify and notify beekeepers within two miles of a site to be treated at least 48 hours prior to the application or as soon as possible. Timely notification will help ensure ample time for the beekeeper and applicator to develop a mutually acceptable strategy to manage pests while mitigating risk to honey bees. This may include covering hives, moving hives, or choosing the time of day to apply. **Notifying beekeepers does not exempt*

*applicators from complying with the pesticide label restrictions. Many insecticide labels prohibit their use if pollinators or bees are present in the treatment area.*

**Choose products with lower risk to pollinators.** Avoid dusts and wettable powder insecticide formulations. Dusts and wettable powder pesticide formulations can leave a powdery residue which sticks to hairs on bees. Bees then bring the pesticide back to the hive and potentially expose the entire hive to the pesticide for an unknown amount of time. Granular and liquid formulations are safer for pollinators since granules are not typically picked up by bees, and liquids dry onto plant surfaces. Also choose products with lower residual toxicity to bees.

**Keep up with label changes and other information.** Labels change as new information is discovered. Uses and precautions may be added or removed with each new shipment of the product.

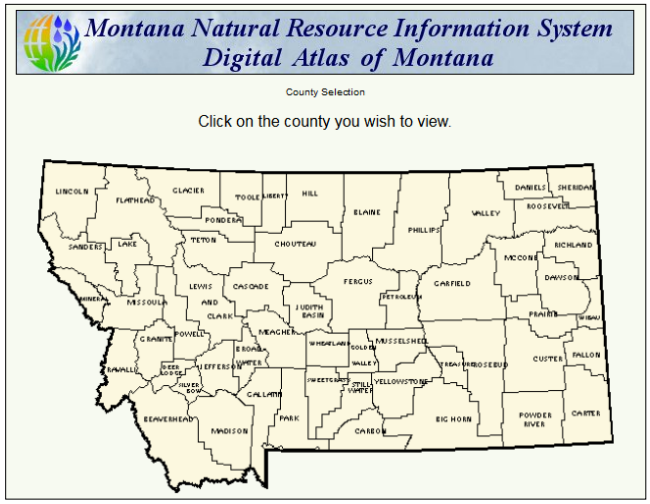
**Minimize all pesticide exposure to pollinators, regardless of the label statements.** It is a good idea to minimize all pesticide exposure, particularly to managed honey bees. Almost all product testing is performed on adult insects. Social insects like honey bees, however, have almost all of their life stages (eggs, larvae, pupae, and adults) present throughout the year. Because they are still growing, and still differentiating new types of tissues, younger life stages are often much more susceptible to chemical exposure than are adult insects. Many herbicides and all of the insect growth regulators have significant effects on larvae, and on honey bee queens, that are not reflected in the precautionary statements on their labels.

**Check the Natural Resources Information System (NRIS) Website:**

The Montana Natural Resource Information System website can be used to check for apiary sites in the area you intend to spray. Keep in mind that this website shows the locations of commercial apiaries only. Landowner and hobbyist apiaries are not shown on the map. **The map is updated on a regular basis, but should not be assumed to show all apiaries located near a treatment area.**

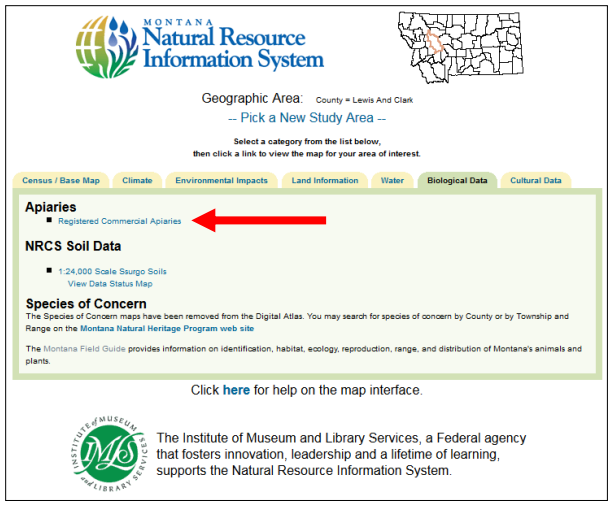
http://maps2.nris.mt.gov/mapper/county.html

1. After accessing the website, click on the county of interest.

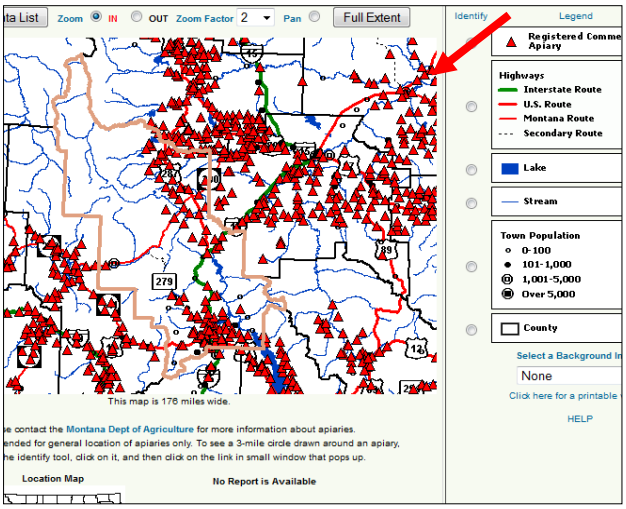



2. Select "Biological Data" from the tabs in the middle of the page.


3. Click "Registered Commercial Apiaries".




4. On the right side of the screen, select "Identify" next to "Registered Commercial Apiary", then click on triangles to get the legal description of the site.



# Guidelines for Landowners/Growers

**Work with beekeepers to choose hive locations.** Ideal locations for hives will have minimal impact on farming/ranching operations, but will still allow bees to access forage and water. Communicate with beekeepers which roads/trails can be problematic when wet and any preferred traffic routes. Landowners may also want to provide contact information for applicators, renters, and neighbors.

**Communicate with renters about bee issues.** Renting land for agricultural production is a common practice. Landowners and renters should discuss bee issues, such as who has authority to allow bees, how long they will be allowed, and hive placement. These should be addressed and included when rental agreements are negotiated.

**Communicate with pesticide applicators whose responsibility it is to look for hives, notify neighbors, etc.** When contracting with commercial pesticide applicators, make sure that there is a clear understanding of who has the responsibility to identify hive locations and communicate with beekeepers. Applicators may do this as part of their standard procedures, but some landowners may prefer to make beekeeper contact themselves.

**Agronomists should consider pollinator impacts when making pesticide recommendations.** Ensure that agronomists and crop consultants consider pollinator issues when making pesticide recommendations, including produce choices and pesticide timing decisions. Request pesticides with low toxicity to bees and other pollinators.

**Utilize alternatives to talc/graphite in planters.** When planting seeds treated with insecticides, utilize alternatives to talc/graphite as they become available. Talc and

graphite can abrade the insecticide treatment of the seeds, creating insecticide-containing dust that can drift onto hives and flowering plants.

**Plant bee forage.** Plant flowering plants, trees, and shrubs to improve bee forage, especially in non-farmable or non-crop areas. Doing so provides forage and it may also concentrate bees away from fields to be treated with pesticides, possibly minimizing impacts to pollinators. Many pesticide labels require untreated vegetative buffer strips around sensitive sites. Plant flowering plants in those buffer strips to provide additional bee forage. If planting cover crops, add flowering plants into the mix. Even a small percentage of flowering plants can provide a considerable amount of forage for pollinators. Be careful, of course, not to treat or allow drift into these areas.

# Guidelines for Beekeepers

**All apiary sites must be registered with the Montana Department of Agriculture per 80-6-102(1), Montana Code Annotated and associated Administrative Rules of Montana (ARM 4.12.101 through 111).**

**Work with landowners to choose hive locations.** Ideal hive locations will have minimal impact on agricultural activities but will still have adequate access to forage and water. Avoid low spots to minimize impacts from drift or temperature inversions on hives. Most landowners also have preferred routes of travel on their property, especially after rains or during particular agricultural operations (harvest, calving, etc.) so plan accordingly when choosing hive locations. Because of the use of smokers and the need to burn hives infected with American foul brood, fire safety is also an important consideration. It may also be prudent for the beekeeper to request contact information

for nearby applicators, renters, casual land users such as hunters or fishermen, and neighbors.

**Be cognizant of neighboring landowners when placing and moving hives.** Neighboring landowners often use the same roads, trails and section lines. Do not block these right-of-ways or place hives so close they may cause problems for the other land-users. Take appropriate steps to ensure that bees do not negatively affect operations of neighboring landowners, such as considering the proximity of hives to neighbors' yards, stock watering areas, equipment, or storage sites.

**Work constructively with applicators when notified of upcoming pesticide applications.** One of the recommended guide lines for pesticide users is to contact nearby beekeepers prior to making pesticide applications. Block, move or net hives if possible when applicators inform you they are going to apply pesticides, or find other strategies to allow pesticide applicators to manage pests while minimizing pesticide exposure to bees.

**Notify landowners and applicators when arriving and moving hives.** If possible, notify nearby pesticide applicators and landowners when you place or move beehives. This will ensure they are aware of current hive locations and can notify you before making pesticide applications. Contact information for nearby pesticide applicators can usually be obtained from landowners.

**Obtain landowner permission for hive placement every year, keep in contact, and comply with all the requirements of Montana beekeeping law.** Properties change hands more often than we expect, even in rural areas, and it is not uncommon for new landowners to be quite surprised when "new" beehives suddenly show up at

the beginning of the season. Personal contact prior to the actual hive placement will keep everyone informed and prevent the apiary site from being perceived as a nuisance. Notifying the MDA when landowner or location information changes will ensure that all locations are accurate when applicators attempt to find them.

**Report all suspected pesticide related bee kills to the MDA.** Inspect bee behavior regularly. The MDA's pesticide enforcement section will respond to complaints, including collecting and analyzing samples from the location for pesticide residues. Some pesticides degrade rapidly, and timely reporting will aid the pesticide investigation. Beekeepers can report suspected pesticide incidents by calling (406) 444-5400 and asking to speak to a representative from the pesticide program.

**Use registered pesticides according to the label.** When pesticide use is necessary to manage pests inside hives, use registered pesticides and comply with all restrictions, precautions, and directions found on the pesticide label. Failure to comply with label directions may decrease the effectiveness of pesticides, increase the risk of adverse effects to bees, and cause unsafe pesticide residues in honey and other products. There are already credible reports of resistance to even the newest pesticide registered for *Varroa* control (Amitraz), for example. Contact the MDA pesticide program with any questions on pesticide labeling or to determine whether a pesticide is registered for use in Montana.

**Ensure hives are easily visible to applicators.** Hives must be visible so applicators can locate them before spraying. It is strongly suggested that hives are painted a color that stands out from the surrounding area. Montana law requires that each apiary site be labeled with the beekeeper's name and contact information. This also helps pesticide

applicators contact beekeepers so that hives can be protected from pesticide exposure

# Supporting Pollinator Forage and Habitat

**Pollinator forage.** Everyone can plant forage for pollinators. Plants that support pollinators are also beneficial for other wildlife, are often visually attractive, and can help improve soil health. Flowers are important for pollinators, but they also utilize trees, shrubs, and other less-noticeable plants for pollen and nectar sources and nesting habitat. It is important to consider diversity when choosing plants to ensure adequate forage for the entire growing season. Diversity will also ensure pollinators have access to all of the nutrients they require to be healthy. Here are some easy, efficient ways to improve pollinator forage:

1) **Municipalities** can plant trees, shrubs and flowers that provide good forage for all types of pollinators. Diversity is important: the pollen and nectar of each species carries a different nutrient load for the pollinators. This can be worked into new plantings, every time a plant is added or replaced choose a variety that will contribute to pollinator forage. Foraging honey bees are typically not aggressive.
2) **Counties** can create bee forage and habitat along secondary roads. Secondary road ditches often contain several species of plants that provide forage and habitat for pollinators. It is a common practice to mow ditches for the safety of motorists and to prevent drifting snow. Consider spot spraying noxious weeds and mowing ditches at a higher height or later in the year to ensure that bee forage and habitat is available. Incorporate short forbs into secondary road ditches to minimize attracting large wildlife.

3) **Homeowners** can put out flower pots, create flowerbeds, plant trees or shrubs, or establish gardens to provide forage and habitat. Homeowners should also take special precaution when applying pesticides. The pesticide user guidelines apply to anyone using pesticides. Remember, the pesticide label is the law and it is in place to minimize risk to the environment and human health.
4) **Create habitat for beneficial wild pollinators.** Roughly 70 percent of native bees nest in the ground. They burrow into areas of well-drained, bare, or partially vegetated soil. Other bees nest in abandoned beetle tunnels in snags or in soft centered, hollow twigs and plant stems. Native bees will also utilize dead trees and branches. Habitats can be created by leaving deadfalls and brush piles as nesting habitat. Consider the type of habitat you wish to create and pollinators you want to attract. Be aware that certain structures may attract other animals such as fox, coyote, skunks, and porcupines.